3.9 NOISE

This section discusses the existing noise levels in the vicinity of the proposed TEP Sahuarita-Nogales Transmission Line Project and describes the basic measurements used for sound.

3.9.1 Background

With regard to this Environmental Impact Statement (EIS), noise concerns are associated primarily with construction activities. Noise is also a potential concern for the operation of transmission lines, as described in Section 3.10.2, Corona Effects. The description of the existing sound environment requires a general understanding of how sound is measured and its effects on the human environment. Because this background information applies to each alternative in the same manner, the discussion is combined rather than repeated separately for each alternative.

Noise is defined as sound that is undesirable because it interferes with speech, communication, or hearing; is intense enough to damage hearing; or is otherwise annoying. The measurement and human perception of sound involve two basic physical characteristics: intensity and frequency. Intensity is a measure of the sound energy of the vibrations, and frequency is the measure of the tone or pitch of the sound.

The physical unit most commonly used to measure sounds is the decibel (dB). The higher the energy carried by the sound, the louder the perception of that sound, and thus, the higher the dB rating of the sound. A sound level of just above 0 dB is approximately the threshold of human hearing and is barely audible under extremely quiet listening conditions. Normal speech has a sound level of approximately 60 dB. The dB scale is logarithmic, meaning that a 60 dB sound is not perceived as twice as loud as a 30 dB sound. Rather, a 60 dB sound is perceived as approximately twice as loud as a 50 dB sound. Humans typically can barely perceive loudness changes of less than 2 to 3 dB.

The second important characteristic of sound is its tone or frequency, which is the number of times per second the air vibrates, measured in Hertz (Hz). The human ear is most sensitive to frequencies in the 1,000 to 4,000 Hz range. To account for the variable response of the human ear to different tones, decibels may be adjusted to A-weighted decibels. The adjusted A-weighted decibels (dBA) represent the human hearing response to sound. The maximum sound levels of typical events are shown in Table 3.9–1.

In addition to measuring a single sound event, a time-average sound level can be calculated (also in dBA) to represent the average sound over a specified length of time. For the evaluation of community noise effects, and particularly construction noise effects, the Day-Night Average Sound Level (DNL) is often used. The DNL averages construction sound levels at a location over a complete 24-hour period, with a 10 dB adjustment added to those noise events that take place between 10:00 p.m. and 7:00 am. This 10 dB "penalty" represents the added intrusiveness of sounds that occur during normal sleeping hours, both because of the increased sensitivity to noise during those hours and because ambient (background) sound levels during nighttime are typically about 10 dB lower than during daytime hours.

It is important to distinguish between the measurement of a single sound event and the calculation of a time-averaged DNL, both of which are often represented in dBA. Because the DNL is a measurement of an average, a DNL of 50 dBA could result from a few noisy events or a large number of quieter events. DNL does not represent the sound level heard at any particular time, but rather represents the total sound exposure.

The U.S. Department of Housing and Urban Development established a DNL standard of 65 dBA for homes that are funded through federally guaranteed loans. In 1974, the U.S. Environmental Protection

Agency (EPA) identified noise levels that could be used to protect public health and welfare, including prevention of hearing damage, sleep disturbance, and communication disruption. Outdoor DNL values of 55 dBA were identified as desirable to protect against activity interference and hearing loss in residential areas and at educational facilities.

Table 3.9–1. Comparative A-Weighted Sound Levels.

Common Outdoor Sound Levels	Sound Level (dBA)	Common Indoor Sound Levels
	110	
Jet flyover at 1,000 feet		Rock band
	100	
Gas lawnmower at 3 feet		Inside subway train
	90	
Diesel truck at 50 feet		Food blender at 3 feet
		Garbage disposal at 3 feet
Noisy urban daytime	80	
		Shouting at 3 feet
Gas lawnmower at 100 feet	70	Vacuum cleaner at 10 feet
		Normal speech at 3 feet
Commercial area	60	
Heavy traffic at 300 feet		
		Large business office
		Dishwasher in next room
	50	
		Small theater, large conference room (background)
Quiet urban nighttime	45	
		Library (background)
Quiet suburban nighttime	40	
		Bedroom at night
		Concert hall (background)
Quiet rural nighttime	30	
		Broadcast and recording studio (background)
	10	
	0	Threshold of hearing

Source: Canter 1977.

3.9.2 Western, Central, and Crossover Corridors

The proposed transmission line corridors cross primarily rural undeveloped land. Thus, current noise levels along each corridor are predominately low, typically with a DNL near 30 dBA. The DNL may increase to 45 to 60 dBA in suburban residential areas and near industry, major roads, and I-19. In wilderness locations the DNL is typically on the order of 20 dBA (Canter 1977).

All existing noise levels are below what is normally considered compatible with residential land uses and other noise impact guidelines. The primary sources of noise are (1) everyday vehicular traffic along

nearby roadways, such as I-19; (2) minor construction activities related to maintenance of roadways, bridges, and the other structures and facilities; and (3) noise associated with industrial activity.

Within the Coronado National Forest, the existing noise sources are minor and are primarily associated with recreation (for example, hikers, off-road vehicle users, and picnickers at Peña Blanca Lake Recreation Area). Existing noise derived from construction and recreation is generally intermittent and highly variable depending on the time of day and year. In addition, the proposed project area, including portions of the Coronado National Forest, is part of a Military Operating Area in which the U.S. Air Force conducts periodic low-level flights.